

Question Paper Code : 30080

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026.

Second Semester

Computer Science and Engineering

PH25C03 — APPLIED PHYSICS (CSIE) – II

(Common to : Computer Science and Design/Computer Science and Engineering (Artificial Intelligence and Machine Learning)/Computer Science and Engineering (Cyber Security)/Computer Science and Engineering (Data Science)/Computer Science and Engineering (IoT)/ Computer and Communication Engineering/Artificial Intelligence and Data Science/Computer Science and Business Systems/Information Technology)

(Regulations 2025)

Time : 3 hours

Maximum : 100 marks

CO – Course Outcomes

CO1	Explain the concepts of physics in computer science stream.
CO2	Apply appropriate techniques in physics to solve engineering problems.
CO3	Analyse physical systems and interpret data from the virtual studies in the core branches in computer science and engineering.

BL – Bloom's Taxonomy Levels

(L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create)

Answer ALL questions.

PART – A (Total Marks = 40)

[Q. No. 1 to Q. No. 10 ; $10 \times 1 = 10$ Marks (Multiple Choice Questions)]

Q. No. 11 to Q. No. 20; $10 \times 3 = 30$ Marks]

Q.No.	Questions	Marks	CO	BL
1.	Coercivity is the field required to: (A) Demagnetize material (B) Increase flux (C) Magnetize material (D) Increase current	1	1	1

2.	Ferrites are suitable for high-frequency applications because they: (A) Are good conductors (B) Are electrically insulating (C) Have high eddy current loss (D) Have low permeability	1	1	2
3.	In magnetic disk storage, data is stored as: (A) Electric charge (B) Light pulses (C) Magnetized regions (D) Heat energy	1	1	2
4.	The binary equivalent of 9_{10} is: (A) 1000 (B) 1001 (C) 1010 (D) 1111	1	2	1
5.	The output of an AND gate is 1 when: (A) All inputs are 1 (B) Any input is 1 (C) Inputs are different (D) Both inputs are 0	1	1	2
6.	Quantum confinement occurs when: (A) Size is very large (B) Size is comparable to electron wavelength (C) Temperature is high (D) Pressure is high	1	2	1
7.	The density of states in quantum dots is: (A) Continuous (B) Semi-continuous (C) Discrete (D) Infinite	1	1	2
8.	The main working principle of a single electron transistor is: (A) Coulomb blockade (B) Ohm's law (C) Faraday's law (D) Kirchhoff's law	1	2	2
9.	The quantum state of a qubit is represented as: (A) Integer (B) Vector (C) Matrix (D) Scalar	1	3	1

10.	The Hadamard gate is important because it: (A) Measures qubits (B) Deletes information (C) Creates superposition (D) Swaps qubits	1	1	2
11.	Distinguish between soft and hard magnetic materials based on coercivity and applications.	3	1	2
12.	What is meant by magnetic data storage?	3	1	1
13.	Describe how data is stored in magnetic disk memories.	3	2	2
14.	Define NAND and NOR gates with their Boolean expressions.	3	1	1
15.	Describe the working principle of an XOR gate with truth table.	3	1	2
16.	What is electron density in bulk materials?	3	1	1
17.	Why does the band gap increase as particle size decreases?	3	1	2
18.	Give the working principle of Coulomb blockade.	3	2	2
19.	What is quantum entanglement?	3	1	1
20.	Describe the working of the CNOT gate.	3	1	2

PART – B (5 × 12 = 60 marks)

Q.No.		Questions	Marks	CO	BL
21.	(a)	Explain the working principle of GMR sensors.	12	3	3
		OR			
	(b)	Explain the principle of magnetic recording.	12	2	3
22.	(a)	Analyze and compare SOP and POS representations.	12	1	4
		OR			
	(b)	Analyze the Boolean simplification using algebraic method and Karnaugh map method.	12	2	4

23.	(a)	Give the mechanism of quantum tunneling and explain its role in nanoscale devices.	12	1	4
	OR				
	(b)	Critically assess the potential of carbon nanotubes as a replacement for conventional materials in nanoelectronics.	12	3	5
24.	(a)	Explain the advantages of quantum computing over classical computing in solving complex computational problems.	12	3	5
	OR				
	(b)	Develop a method to visualize qubit transformations using the Bloch sphere and explain its significance.	12	3	6
25.	(a)	(i) Apply domain theory to explain the magnetization process in a ferromagnetic material when an external magnetic field is applied.	4	2	3
		(ii) Convert the decimal number 156.75 into binary form and verify the result.	8		
	OR				
	(b)	(i) Using size dependence, explain how Fermi energy varies in nanomaterials.	4	2	3
		(ii) Using appropriate quantum gates, explain how a qubit changes state when subjected to Pauli-X, Y, and Z gates.	8		